# Installation Instructions

**451**
SERIES B

## GAS-FIRED AIR CONDITIONER

bryant

39451D7
Rev 11/17/64

Installation of the Model 451 Gas Air Conditioning Absorption unit consists of the following steps:

I. Locate and mount absorption unit.
II. Connect chilled water lines.
III. Electrical connections.
IV. Gas connections.
V. Charge system with water.
VI. Check-out and Operation.
VII. Adjust gas input.
VIII. Balance system.
IX. Purge Non-Condensibles.

Each of the above steps is discussed in detail in this instruction. Read entire instruction before starting installation.

Position unit and remove wooden shipping crate base as shown in Figure 1.

1. Saw wood stringers as shown.

2. Remove unit access panels and remove 3 shiping bolts from crate base.

3. Tilt one end of unit and remove half-section of crate base; then remove remaining section while tilting the other end.

### I. LOCATE AND MOUNT ABSORPTION UNIT

The absorption unit may be located at ground level or on the roof. Consult local codes for information concerning proximity to property lines, height above roof, obstructions, etc.

#### A. MOUNTING BASE

1. Use non-combustible materials.

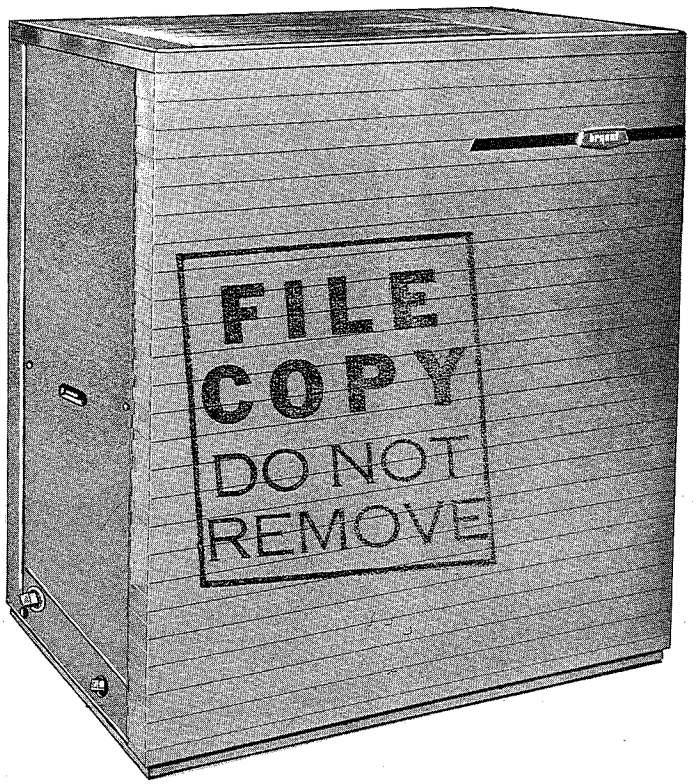
2. Suggested types of mounting base for ground installation:

a. Precast concrete lintels.

Use two lintels across complete width of unit, one located under front and one under rear, or three lintels the depth of unit, one each under right and left end of unit and one at center of unit.

b. Concrete blocks.

Use one block at each corner of unit plus a fifth block under the front midway between the front corner blocks.




c. Concrete slab.

Minimum thickness 4 inches.

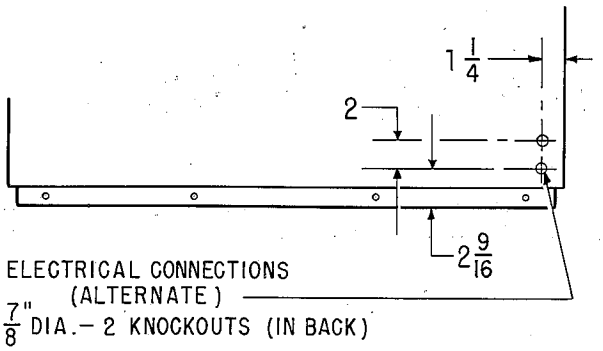
3. On roof installations, leave sufficient clearance between unit base and roof for proper air circulation. Use precast concrete lintels or concrete blocks as described in Paragraph 2 above or steel beams.

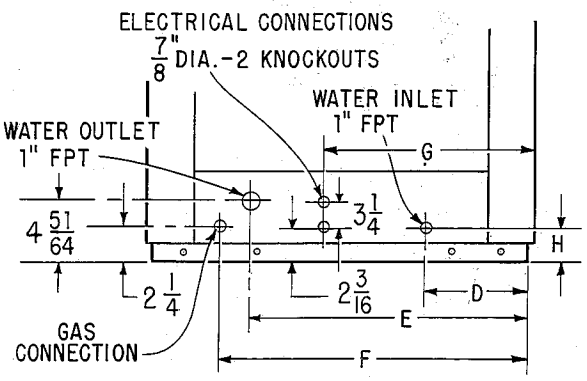
#### B. CLEARANCES

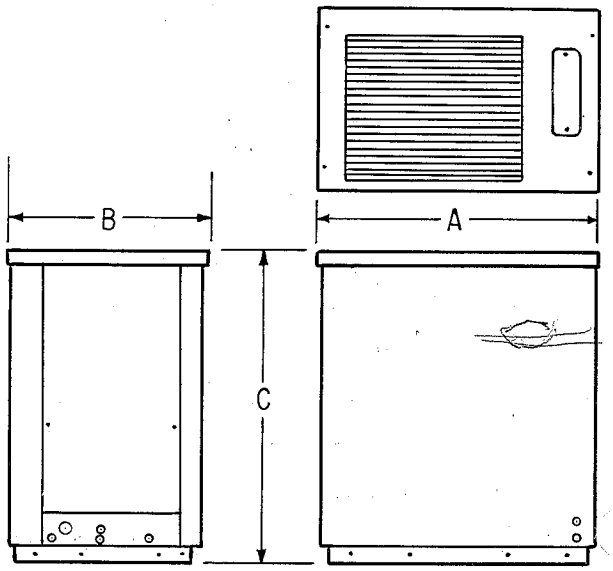
See Figures 2 and 3 for typical locations.

1. Absorption unit should have a minimum clearance of 2 feet on all sides from any adjacent obstruction.

2. Avoid locating the unit where hot condenser discharge air can impinge on nearby obstructions and mix with the inlet air supply. The condenser air discharges upward at a small angle toward the front of the unit. With the condenser facing the wall the unit can be located at, or outside of the plumb line from any over-hang.




| Model | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 36-451 | 46 | 31 | 52 | 9-1/16 | 23-9/64 | 26-1/8 | 17-5/16 | 3-7/64 |
| 54-451 | 55 | 38 | 59 | 11-1/16 | 28-3/4 | 32-7/16 | 23 | 3-39/64 |

| | | 36-451 | 54-451 |
|---|---|---|---|
| Cooling Capacity | Btuh | 35,000 | 54,000 |
| Heat Input | Btuh | 110,000 | 165,000 |
| Condenser Air Delivery | Cfm | 4,500 | 6,700 |
| Water Flow (Min. Required) | Gpm | 7.5 | 11 |
| Max. Frictional Loss Handled by Chiller Pump | Ft Head | 30 | 26 |
| Max. Elevation of Coil above Chiller | Ft | 30 | 30 |
| Pump and Fan Drive 115V, 60 Cy., 1 Phase | HP | 1/3 | 1/2 |
| Minimum Wire Size * | AWG | 14 * | 12 * |
| Refrigerant Type | | 717 | 717 |
| Refrigerant Amount | Lb | 18 | 31 |
| Approximate Shipping Wt. | Lb | 780 | 1,095 |

*Satisfactory where distance, measured along wire path, between unit and connection into main panel does not exceed 100 ft. Where distances are longer, wire sizes should be increased accordingly.

TABLE I

| Nominal Pipe Size Inches | Allowable Distance* between Coil and Chiller | | | | | |
|---|---|---|---|---|---|---|
| | Polyethylene Pipe | | Copper Pipe | | Galvanized Pipe | |
| | Size 36 | Size 54 | Size 36 | Size 54 | Size 36 | Size 54 |
| 3/4 | 65' | - - | 55' | - - | 50' | - - |
| 1 | 240' | 85' | 210' | 65' | 180' | 70' |
| 1-1/4 | 880' | 295' | 565' | 190' | 720' | 240' |

*Note: Values shown in above table are for one direction only. The total length of pipe from chiller to coil and return would be double the above table values. The above table applies to single unit installations only.

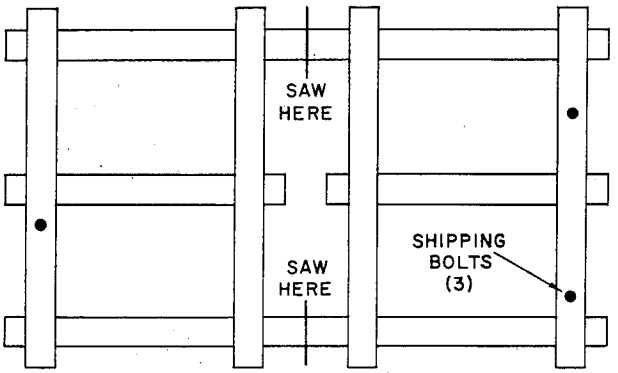



Figure 1

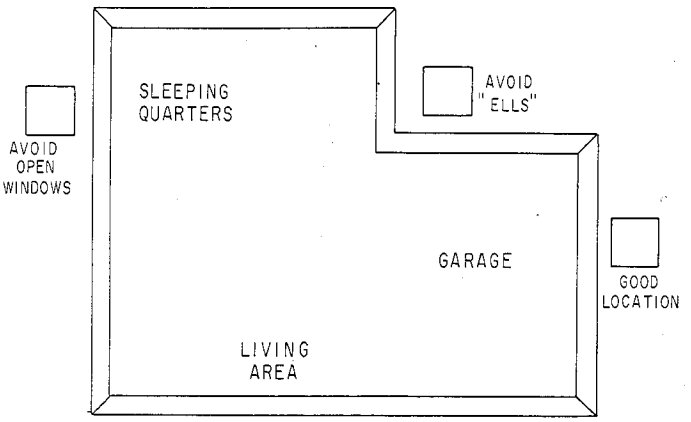



Figure 3

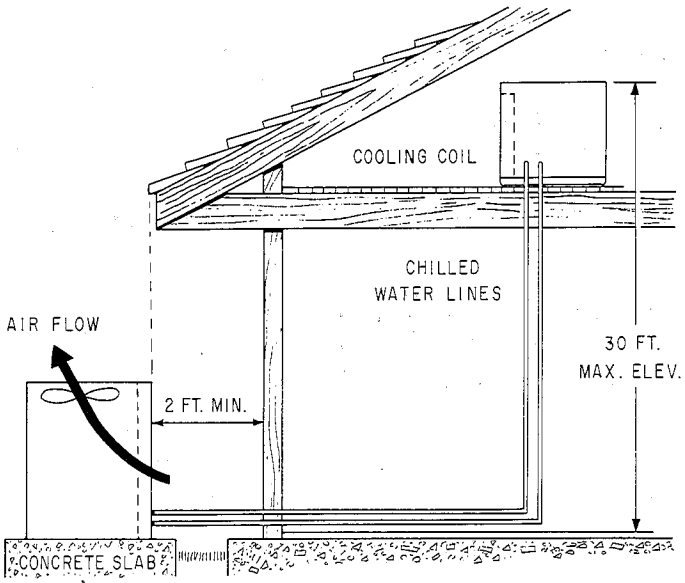



Figure 2

## II. CONNECT CHILLED WATER LINES

### A. MATERIALS

Refer to section on "Cold Weather Protection" at the end of this instruction.

1. Piping

a. Polyethylene Plastic Pipe - use medium density flexible pipe whose wall thickness approximates Schedule 40 pipe (Commercial Standard CS 197-60). Pipe must be virgin plastic. Do not use pipe manufactured from re-claimed plastic.

b. Copper - satisfactory substitute.

c. Galvanized - satisfactory substitute.

2. Fittings

a. Galvanized - use when possible.

b. Brass - satisfactory substitute.

c. Nylon - satisfactory substitute.

### B. PIPE LENGTH AND DIAMETER

Table I shows maximum length of pipe of different diameters that can be used between the pump discharge and the coil inlet and still maintain minimum allowable (design) water flow rate.

1. Multiply table values by two to obtain the total length of pipe from chiller to coil and return.

2. Length is measured along the pipe path and therefore includes vertical distance between the water coil and the chiller.

3. Lengths shown in Table I are based on using a total of eight elbows in the entire water line (chiller to coil and return). Lengths are predicated on the use of a Bryant matching water coil. For greater distances use larger pipe or add a pump.

## C. INSULATION

1. Insulate supply and return lines separately.

2. Material should be of good quality and be covered with a good vapor barrier. Armaflex or equivalent is recommended.

Wall thickness:
1/2" wall thickness - south of 40° N. latitude
3/8" wall thickness - north of 40° N. latitude

## D. HEIGHT OF COIL ABOVE ABSORPTION UNIT

Maximum vertical distance from chiller outlet to top of coil is 30 feet for both sizes. For greater heights, a greater pumping head is required. Increasing the pipe size will not help.

## E. WATER COIL CONNECTIONS

1. If cooling coil is used in connection with heating unit, install cooling coil in parallel with or downstream of heating unit to avoid condensation in the heating unit.

2. If coil is located in warm air stream, do not connect polyethylene pipe directly to coil. Connect a minimum of 24 inches copper or galvanized pipe to both the coil inlet and outlet. Then connect the plastic pipe to these nipples.

3. On installations where the outside piping freezes and the coil is in a heated air stream, precautions must be taken to provide for water expansion. The connecting polyethylene plastic pipe acts as an expansion vessel if there is enough footage of this pipe in the heated space (space not subject to freezing). The following table shows the minimum lengths (total inlet and outlet) of plastic piping of various diameters that are required for both sizes of coils to provide adequate expansion volume.

| Nominal Pipe Size Inches | Length of Plastic Pipe in Feet | |
|---|---|---|
| | Size 36 | Size 54 |
| ¾ | 24 | 56 |
| 1 | 15 | 35 |
| 1¼ | 8.5 | 20 |
| 1½ | 6.5 | 14.5 |

If the total plastic chilled water line footage in the heated space is not as long as the minimum values shown in the table, tee a vertical pipe of sufficient volume into either of the coil connections to provide for expansion, or the line should be drained.

# III. ELECTRIC CONNECTIONS

1. Make all electric connections in accordance with the National Electrical Code and any local ordinances or codes that might apply.

2. Provide a separate power supply for the air conditioner.

3. Provide a fused disconnect switch within sight of and not more than 50 feet from the absorption unit.

Size 36 - use 30 amp. standard fuse or 15 amp. fusetron.

Size 54 - use 35 amp. standard fuse or 20 amp. fusetron.

4. The absorption unit is shipped fully wired from the factory. Connection of 115V power and low voltage connection to the thermostat control are required in the field. Before proceeding, inspect factory wiring for loose connections which may have resulted during shipment.

5. Figure 6 is the Wiring Diagram. Do not fasten power leads to hot tubing since wire insulation could be damaged and a short circuit could result.

6. Disconnect pump electrical lead at terminal 7 in control box before energizing unit when ready to check field wiring. **Do not operate the pump dry.**

# IV. GAS CONNECTIONS

Consult local gas company before making any gas connections. In case of conflict with this instruction, local requirements should be followed.

Before selecting the size and type of pipe that is to be used for installing the absorption unit, be sure to check with local gas company for the necessary information. The size of the gas pipe to be used will depend upon the length of run and the allowable pressure loss established by the utility.

The gas connection to the unit is made at the 1/2" combination regulator-shut-off. The supply pipe enters the unit through the knockout on the left side. Install a 1/2" ground joint union and ELL adjacent to the combination regulator-shut-off using two 1/2" x close nipples. On the 36 size use a 1/2" ELL and then 1/2" pipe to the left side of the unit. On the 54 size use a 1/2 x 3/4 reducing ELL and then 3/4" pipe to the left side of the unit.

A wrench-type shut-off valve should be installed in the gas line within sight of, and convenient to, the 451.

Joint compound (pipe dope) which is resistant to the action of liquefied petroleum gases should be applied sparingly and only to the male threads of the joints.

Install a drip leg trap in the gas supply riser leading to the unit. After gas pipe connections have been made, purge the lines and check for leakage. Use a soap and water solution or other such material.

Never use matches, candles, flame or other source of ignition to check leakage.

## PILOT

Light the pilot using the procedure outlined on the Lighting Instruction Plate attached to generator. The pilot flame should be soft blue in color. The flame should be of sufficient length to provide good impingement on the unimetal element of the Bryant pilot. Flame should extend upward between the carry-over ports of the two adjacent burners.

If the pilot flame does not have the appearance described above, it may be adjusted by means of the manual pilot shut-off valve which is equipped with an adjustable screw. Turn the handle to the full-open position and remove the screw cap on the valve handle, thus exposing the adjustable screw. Turn adjusting screw until flame has the desired appearance. Replace screw cap.

## V. CHARGING THE SYSTEM WITH WATER

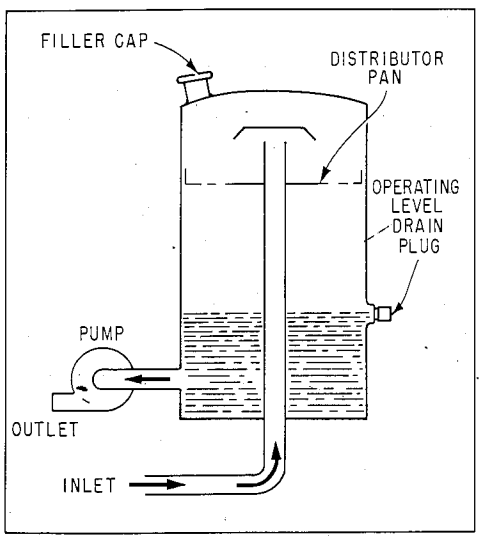



Figure 4

Caution: Do not run the pump dry. Freezing conditions will not damage the pump; however, do not attempt to operate the pump when chiller or chilled water lines are frozen.

1. Turn off main manual gas shut-off valve.

2. Remove the filler cap located on top of chiller tank.

3. Disconnect water line at chiller inlet. (When installing the chilled water lines, it is advisable to leave this connection open until lines have been flushed).

4. Fill tank with tap water until distributor pan at top is covered with water. A garden hose is useful for this filling operation.

5. Start pump. Continue to supply water to the tank and operate pump until all foreign matter has been flushed from the lines. Then remove hose.

Note: If water does not circulate when the pump is started, air may be trapped in the pump. Bleed the air from pump through the 1/8" slotted head bleed valve located on top of the pump discharge. Open valve with screw driver. Close valve when the trapped air is removed and water appears.

6. Remove operating level drain plug and continue to operate pump until water stops flowing from drain opening.

7. Turn off pump. Make pipe connection to chiller inlet.

8. Replace operating level drain plug finger tight. Add several gallons of water to tank to raise water level above drain opening.

9. Start pump. Adjust water level with pump running. This is accomplished by removing drain plug. When water ceases to drain, the level is properly adjusted.

10. Add contents of chilled water additive package to chiller tank through filler opening at top of tank. The package supplied is sufficient for chilled water systems containing up to 20 gallons of water. For systems larger than 20 gallon capacity, add 1/2 package for each additional 10 gallon capacity or fraction thereof. To estimate chilled water capacity of system refer to Table II on following page.

11. Replace filler cap.

12. The system is now ready to operate.

TABLE II

| | Water Capacity Gallons |
|---|---|
| 36-451 Chiller | 6.2 |
| 54-451 Chiller | 9.7 |
| Bryant 1½ ton coil | .6 |
| Bryant 3 ton coil | 1 |
| Bryant 4½ ton coil | 1.5 |
| 1 Ft. of ¾" pipe | .03 |
| 1 Ft. of 1" pipe | .05 |
| 1 Ft. of 1¼" pipe | .08 |

## VI. CHECK OUT AND OPERATION

1. Be sure main manual gas valve is off. Light pilot as described on instruction plate.

2. Set thermostat to "cool"; set thermostat fan switch to "auto"; set thermostat below room temperature.

3. Turn on main electric switch to unit.

4. Check indoor fan operation by turning thermostat fan switch to "on" for continuous fan operation. Move thermostat above room temperature and observe that the indoor fan remains on.

5. To place the system in operation, open the main manual gas valve, replace all panels, and set the thermostat at the desired temperature.

### High Temperature Cut-Off

The high temperature circuit includes a high temperature control located on the front of the generator plus a high temperature relay (lockout relay) located in the control box. If the generator becomes overheated the contacts in the high temp control open, causing the high temp relay to go into lockout position. The gas valve closes, the fans and pump stop, and they will not recycle until the lockout relay is reset. To reset lockout relay turn electric power off and then back on. **Be sure to locate and correct cause of high temp cut-out.**

## VII. ADJUST GAS INPUT

Gas input should agree with that shown on the rating plate of the unit. The burners are equipped with fixed orifices intended to give the correct gas input with a manifold pressure of 3" w.c., using 1030 BTU natural gas of 0.63 S.G. **Before lighting burners, inspect to be sure that they have not become dislodged or cocked during shipment and installation.**

To measure gas input, proceed as follows:

1. Adjust primary air if necessary.

2. Measure the gas input at the meter. Be sure all other gas appliances are turned off. Input at the burners may be increased or decreased slightly by adjustment of the regulator in the burner supply line.

**Caution:** Prolonged operation of the unit should not be attempted with the panel off. The unit may be run for short periods with the panel removed.

## VIII. BALANCE THE SYSTEM

After the unit is in operation and the input has been measured and adjusted to agree with the rating plate requirements, balance the system.

Any approved method of checking the air flow over the water coil may be utilized. Reference is made to the Bryant Service Manual on Gas Air Conditioners for a review of standard methods.

## IX. PURGE NON-CONDENSIBLES

Purging is accomplished through valve **A** on inlet tank and Valve **D** on purge pot.

Operate unit for a minimum of 15 minutes. While still operating, proceed as follows:

1. Attach adapter and purge line to Valve **A**.

2. Run purge line to bucket of water.

3. Remove cap and open valve **A** about 1/8 to 1/4 turn.

4. If non-condensibles are present, bubbles will rise to the surface of the water in the bucket.

5. Leave Valve **A** open as long as bubbles rise to the surface of the water. When non-condensibles are removed the bubbles will cease as ammonia will be absorbed into the water.

6. Close Valve **A**.

7. Open Valve **D** about 1/8 turn. Usually there will be some solution trapped in the valve body, and this solution will be released as soon as the valve is opened.

8. If non-condensibles are present they will follow the initial surge of solution. When solution reappears in quantity, the non-condensibles trapped in the purge pot have been released.

9. Close Valve D.

The installation should now be complete.

## FREEZING WEATHER PROTECTION

### 1. GAS AIR CONDITIONER

The Gas Air Conditioner has built-in freeze protection sufficient to protect the chiller and pump plus a small amount of external hard (non-plastic) pipe as shown in Figure 5.

### 2. CHILLED WATER PIPES

If hard pipe (non-plastic) is used for the chilled water lines, it will be necessary to drain the lines or add anti-freeze. The recommended anti-freeze is methanol (uninhibited methyl alcohol). Since the fluid will not be pumped, only enough methanol is required to form slush. Add one gallon of methanol for each 20 gallons of water or fraction thereof, and circulate 10 minutes. The chilled water additive (Borax) must be used in the same proportion as indicated in Section V when anti-freeze treatment is required.

### 3. CHILLED WATER COIL

If water coil is subject to freezing temperatures, it will be necessary to protect the coil by the addition of anti-freeze. **Chilled water coils cannot be completely drained.** Add one gallon of methanol for each 20 gallons of water or fraction thereof, and circulate 10 minutes. The chilled water additive (Borax) must be used in the same proportion as indicated in Sec. V when anti-freeze treatment is required.

### 4. OPERATION AT FREEZING TEMPERATURES

If the air conditioning system is to operate under freezing conditions, it will be necessary to add methanol in the amount required to protect to the lowest outdoor temperature. Consult your Bryant distributor for recommended procedure.

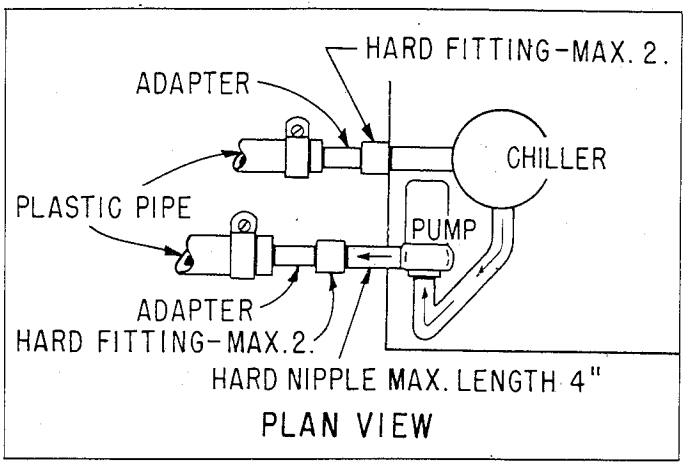
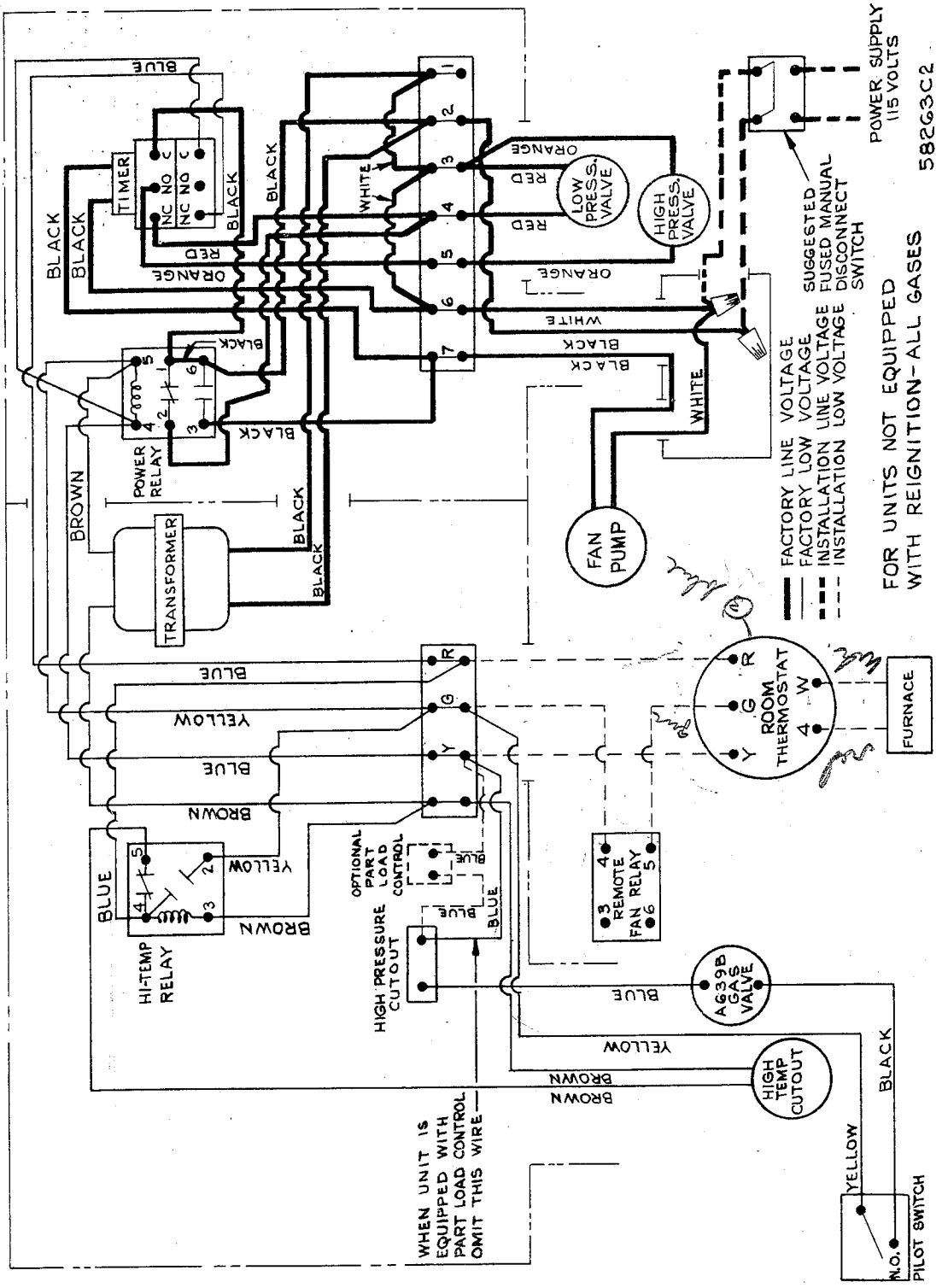
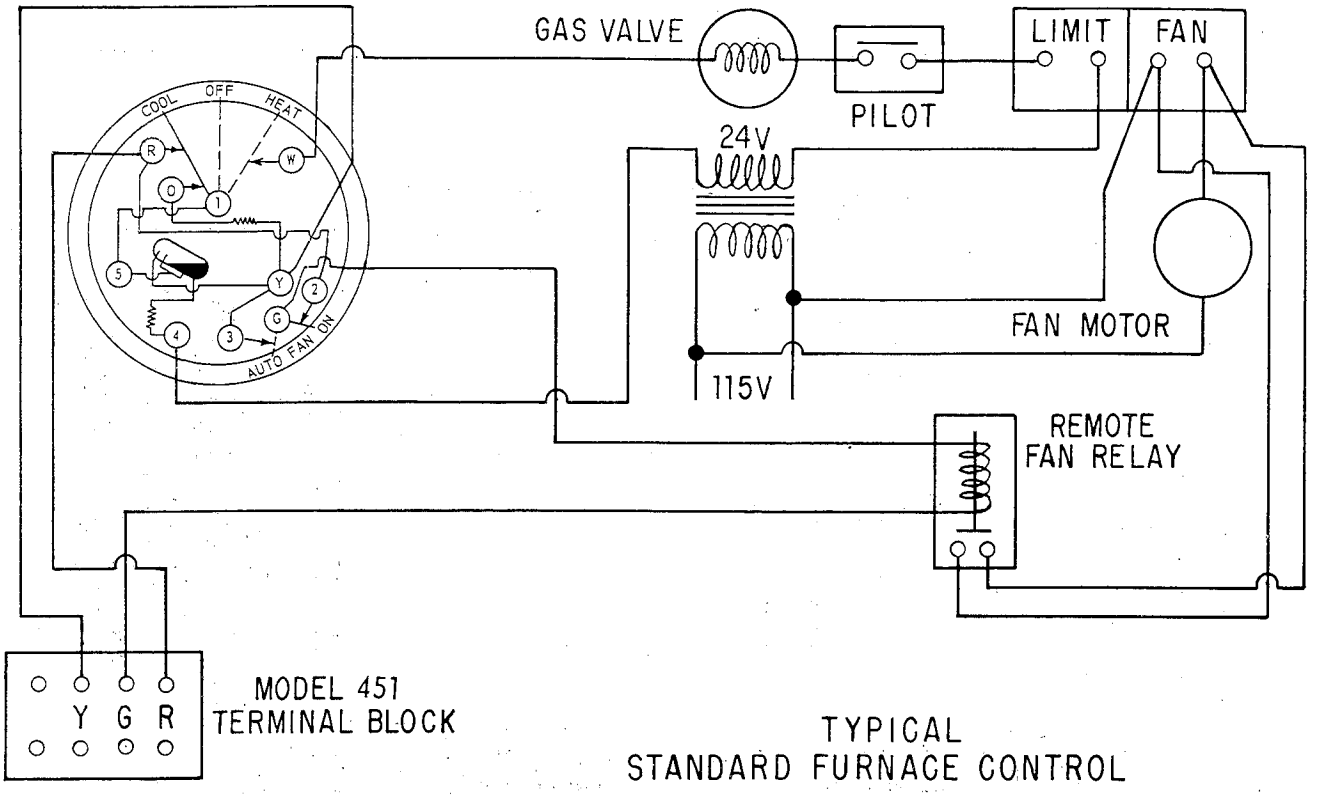
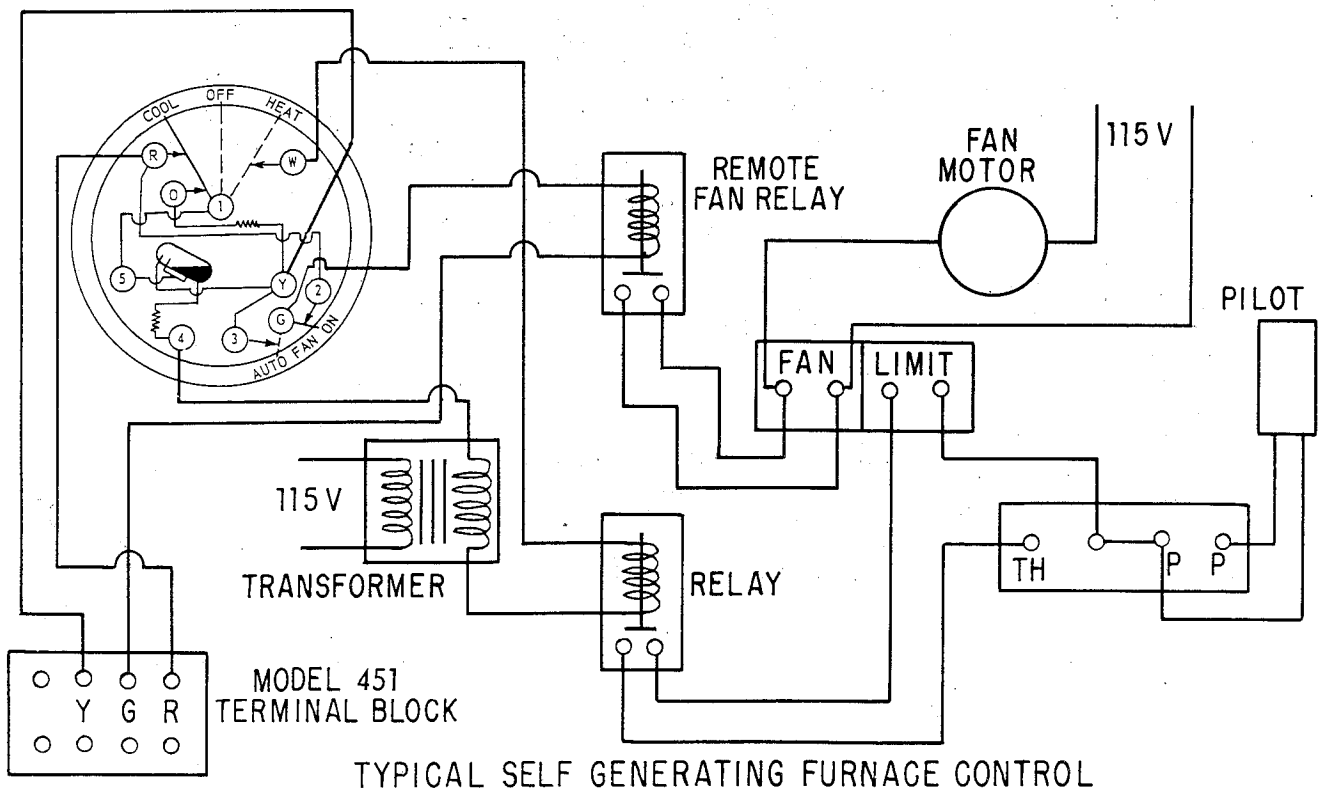



Figure 5

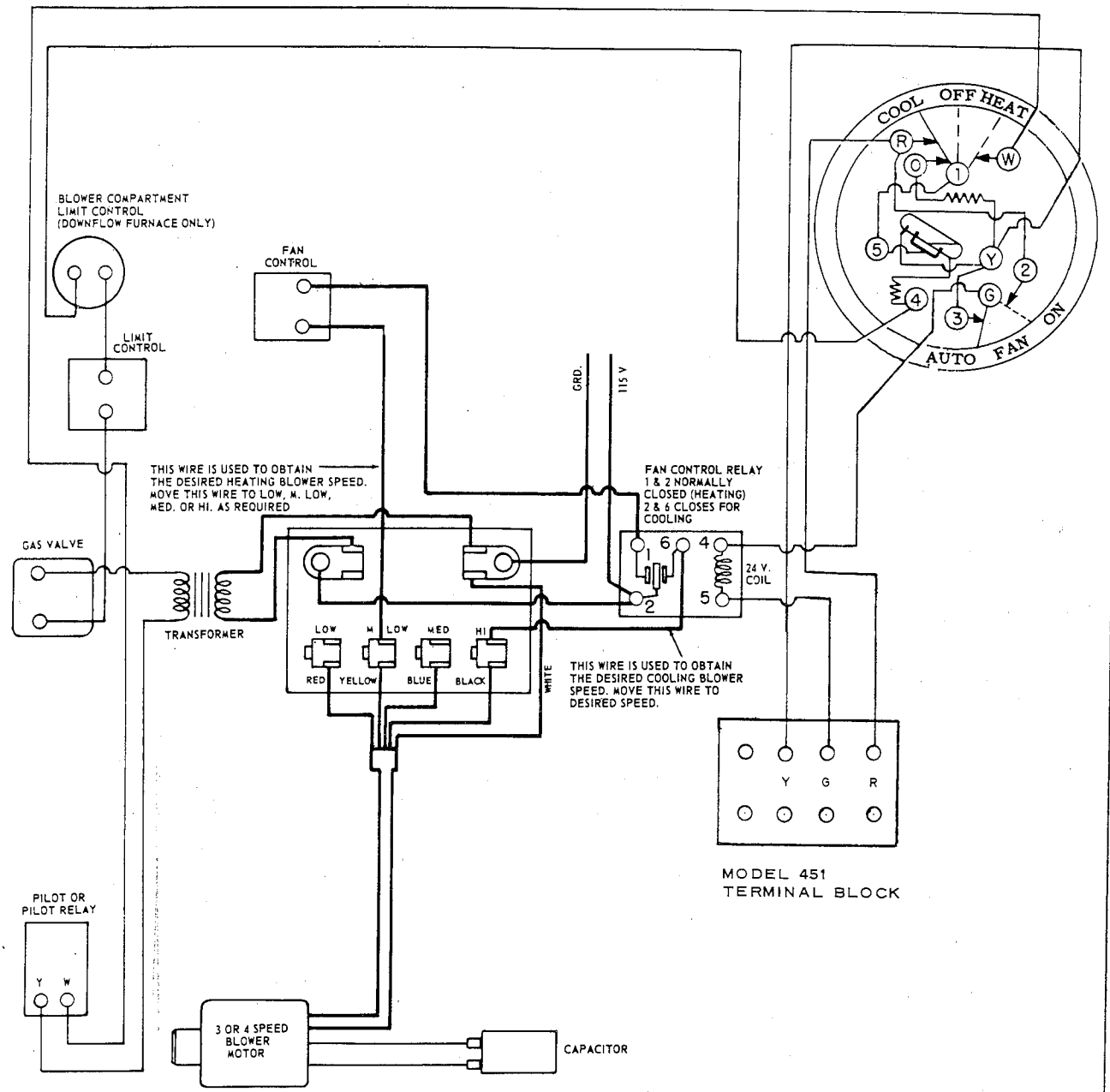

FOR UNITS NOT EQUIPPED WITH REIGNITION-ALL GASES
582G3C2
POWER SUPPLY 115 VOLTS
SUGGESTED FUSED MANUAL DISCONNECT SWITCH
FACTORY LINE VOLTAGE
FACTORY LOW VOLTAGE
INSTALLATION LINE VOLTAGE
INSTALLATION LOW VOLTAGE
TIMER
POWER RELAY
TRANSFORMER
FAN PUMP
LOW PRESS. VALVE
HIGH PRESS. VALVE
ROOM THERMOSTAT
FURNACE
HI-TEMP RELAY
OPTIONAL PART LOAD CONTROL
HIGH PRESSURE CUTOUT
REMOTE FAN RELAY
A639B GAS VALVE
HIGH TEMP CUTOUT
PILOT SWITCH
WHEN UNIT IS EQUIPPED WITH PART LOAD CONTROL OMIT THIS WIRE
BLUE
BLACK
WHITE
ORANGE
RED
YELLOW
BROWN




TYPICAL
STANDARD FURNACE CONTROL




TYPICAL SELF GENERATING FURNACE CONTROL




TYPICAL
FURNACE WITH MULTI-SPEED TAPPED BLOWER